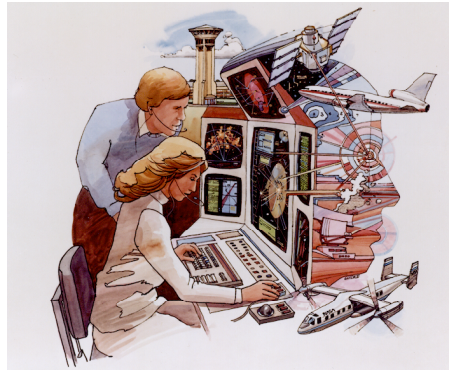
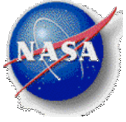


Aeronautics Research Management Directorate Human Factors Symposium



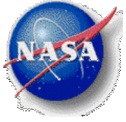
Richard H. Mogford, Ph.D.
Human Measures and Performance Project Manager
Ames Research Center



Welcome!



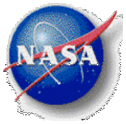
- This is the first Aeronautics Research Mission Directorate Human Factors Symposium
 - Sponsored by Human Measures and Performance Project, Human Factors Research and Technology Division, and NASA Ames Research Center
- Goal is to coordinate and share information on human factors research within the Aviation Safety and Security, Vehicle Systems, and Airspace Systems Programs
- Also to provide information on human factors research and capabilities to our partners in the FAA, NASA, and other organizations
- We want to share our research and identify directions for future work



Overview of NASA Aeronautics Human Factors



- Human factors research is conducted in support of the Aviation Safety and Security, Vehicle Systems, and Airspace Systems Programs
- Work includes fundamental research, tool design, procedures development, prototype systems, and system design and testing
- There is also human factors work in NASA's space program, and some of our researchers support this too (e.g., shuttle flight deck redesign)
- In NASA, there is no central human factors office and activities are managed under the various projects and programs
- The Aeronautics Research Mission Directorate is one of the four mission directorates in NASA



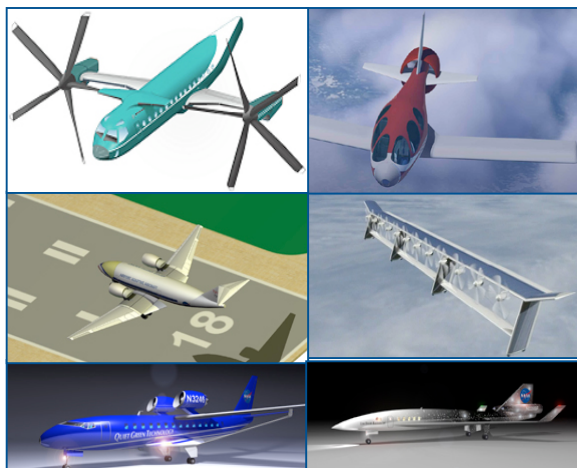
Aeronautics Mission Research Directorate



NASA Programs under the Directorate:



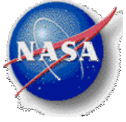
Aviation Safety and Security



Vehicle Systems



Airspace Systems



Aviation Safety & Security Program



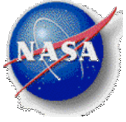
Goal:

Decrease the aircraft fatal accident rate and the vulnerability of the air transportation system to threats and mitigate the consequences of accidents and hostile acts

Outcomes:

- By 2005, enable a reduction of the aviation fatal accident rate by 50% from the FY 91-96 average
- By 2009, enable a reduction in the vulnerability exposure of aircraft and other components in the air transportation system
- By 2012, facilitate the near real-time identification and resolution of risks and vulnerabilities in the air transportation system





Vehicle Systems Program



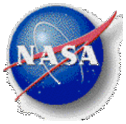
Goal:

Enable key vehicle capabilities to fulfill the needs of the future air transportation system

Outcomes:

- Enable short-field take-off and landing while maintaining the capability for high-speed cruise
- By 2007, enable a reduction in community noise due to aircraft by half, based on the 1997 state-of-the-art
- By 2007, enable a reduction of nitrogen oxides emissions by 70% from the 1996 ICAO standard, to reduce smog and lower atmospheric ozone
- By 2007, enable a reduction in carbon dioxide greenhouse gas emissions by 25% based on the 2000 state-of-the-art for airframe and engine component technologies





Airspace Systems Program



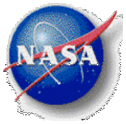
Goal:

Enable, through technology development and transfer, major increases in the capacity and mobility of the air transportation system by development of revolutionary concepts for operations and vehicle systems



Outcomes:

- By 2004, develop, demonstrate and transfer technologies that enable a 35% increase in aviation system throughput in the terminal area and a 20% increase in aviation system throughput en route based on 1997 NAS capacities
- By 2005, develop, demonstrate and transfer key enabling capabilities for a small aircraft transportation system
- By 2009, develop, demonstrate and transfer technologies that enable a further 5% increase in throughput in the terminal area and a further 10% increase in en route throughput based on 1997 NAS capacities

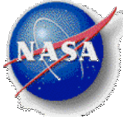


Human Factors Review: Precursor to Symposium

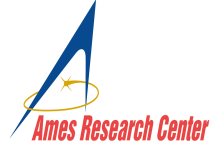


- Human factors tasks reviewed for the three Programs (Fall 2003)
- Tasks listed by category for each Program/Project
- Each number links with a task record

PROGRAM/PROJECT	HUMAN FACTORS ACTIVITY																		
	Human-System Interaction Design	Displays, Controls, and User Interfaces	Environment and Workspace	Personnel Selection and Training	Workload	Human Performance and Cognitive Modeling	Human Error	Anthropometrics	Procedures	Safety and Health	Decision-making	Human Information Processing	Roles, Responsibilities, Communications, and Teamwork	Psychophysiological Research	Human Factors Methods, Guidelines, and Standards Dev't	Data Analysis and Display	Work Factors (fatigue, stress, etc.)	Perceptual Factors in Human-System Interaction	Metrics and Measurement
VEHICLE SYSTEMS PROGRAM																			
Breakthrough Vehicle Technologies Project		1																	
Propulsion & Power Project																			
Flight Research Project																			
Twenty First Century Aircraft Technology Project																			
Quiet Aircraft Technology Project																			
Ultra Efficient Engine Technology Project																			
Advanced Vehicle Concepts Project																			
AVIATION SAFETY PROGRAM																			
Aviation System Monitoring and Modeling Project																			
System-Wide Accident Prevention Project			8	3 4 5		1	2								6 7 9				
Single Aircraft Accident Prevention Project																			
Weather Accident Prevention Project	21	22			24	25	26		27		23		29	30	31				
Aviation Weather Information Systems	33	32									28								
	34	37									36								
	35										40								
	38																		
	39																		
Synthetic Vision Project	10	11		12	13	14	15		16		17		18	19	20				
AIRSPACE SYSTEMS PROGRAM																			
Advanced Air Transportation Technologies Project	1	2			3	4	5		6		7		8		9				
Virtual Airspace Modeling Project	13	14			15	16	17		18	19			20		21				
Airspace Operations Systems Project	31	41		24		35					25	26		29			22	28	32
	40					36						27		39			23	30	
	42					43						38						33	34
					44													37	45
Small Aircraft Transportation System Project		10			11				12										

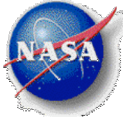


Sample Task Record



- Each task record provides basic information on the task
- One follow-up recommendation was to hold a symposium to coordinate work

Number	8
Human Factors Activity Title	Augmented/Virtual Reality Displays for Aviation Maintenance & Inspection
Performing Organization	IH
Point of Contact	Barbara Kanki
Duration (Start/Finish)	FY00-FY05
Description	(a) Image-based communication and advisement system which includes the equipment and human processes involved in an image-based communication system that enables collaborative problem solving, advisement, and documentation. Imagery in CEST is comprised of scenes and views of workpieces and objects that are referents in the problem solving and advisement communication, and is recordable. (b) Development of a virtual-reality device to train maintenance inspectors and test results. Initial prototype will be a CBT (computer-based training) interactive training tool to augment existing classroom and on-the-job inspector training. This product is based on existing virtual-reality hardware that will be upgraded and appropriate software developed.
End Users	Air carrier maintenance departments, contract maintenance facilities, FAA and general aviation fleet operators
Products	Hardware/software and test results
Internal Collaborations	IH
External Partnerships	Clemson University, Boeing



Details



- Organization of Symposium:
 - First day is introductions and keynote
 - Second and third days have three parallel sessions
 - Topics are user interface design, human performance, and basic research
 - Fourth day has tours of the human factors research facilities at Ames
 - Information on all this is at the registration desk
 - Please register for tours today and we will set up gate passes
 - AM coffee and on-site lunch is on pay-to-eat basis
 - > Please pay today and you will be set up for tomorrow's food
 - > If you pay Tuesday, you will be set up for Wednesday
- There will be a post-event questionnaire
 - We want your feedback on the Symposium and your ideas about important directions for human factors research
- Presentations will be available on the web site one week after the Symposium
- We plan to hold this symposium each year